

Lunar Librarian Newsletter

April - May 2008



Vol. 3. Issue. 4-5



The LRO spacecraft is coming along nicely. The following are two links to show different stages of the construction process. The video, <http://lunar.gsfc.nasa.gov/images/multimedia/LRO-022808.wmv>, starts with the propulsion tank as different panels are added to the bus. This video, <http://lunar.gsfc.nasa.gov/images/multimedia/LRO-Inst-Integration.mpg>, shows the integration of the LRO instruments. These videos take place at NASA's Goddard Space Flight Center, Greenbelt Maryland.



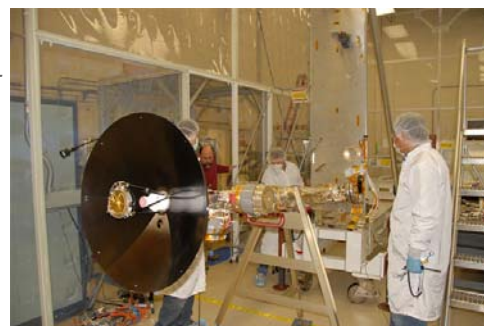
What's been going on since March?

In April, two instruments, LEND and LOLA, were installed on the Orbiter. The blanket team has been working hard. They prepared the solar array gimbal for its thermal vacuum test, and fabricating the blankets needed for the High-Gain Antenna System. They also created the templates necessary to build the blankets for the rest of the spacecraft.

To the right, Glenn Byron, Greg Martins, and Suk Yoon prepare the High-Gain Antenna System for deployment testing while Mike Golob looks on from the doorway. The system is completely assembled and ready for blankets.



The LOLA OTA, to the left, is inspected prior to integration with the Orbiter.



The mechanical team, to the right, installs LEND on the Orbiter.



As of mid-May, all of the instruments are on the Orbiter! LROC arrived on May 9th, and it is now installed. The Mini-RF antenna is not yet installed, but the electronics are on the avionics panel and have been connected to the Orbiter electronics. We have a lot of testing ahead of us, but the integration phase is nearly complete. Everything is now at Goddard Space Flight Center. The Solar Array System (SAS) and the High-Gain Antenna System (HGAS) are the last two components to integrate. SAS final assembly is underway, and the HGAS is in the thermal vacuum chamber undergoing its final testing.



LRO is in the clean room after LROC integration.

LRO merchandise is once again available!!

Check out: <http://www.lro.eliteimagestore.com/> for LRO merchandise. There is a new selection of items available. Orders can be placed with a credit card and shipped directly to the location of your choice.

Did you know you can follow LRO on Twitter? Just go to: http://twitter.com/LRO_NASA

NASA News

Send Your Name to the Moon Aboard LRO!

NASA invites people of all ages to join the lunar exploration journey with an opportunity to send their names to the moon aboard the Lunar Reconnaissance Orbiter, or LRO, spacecraft.

The Send Your Name to the Moon Web site enables everyone to participate in the lunar adventure and place their names in orbit around the Moon for years to come. Participants can submit their information at <http://www.nasa.gov/lro>, print a certificate and have their name entered into a database. The database will be placed on a microchip that will be integrated onto the spacecraft. The deadline for submitting names is June 27, 2008. (http://www.nasa.gov/mission_pages/LRO/main/index.html)

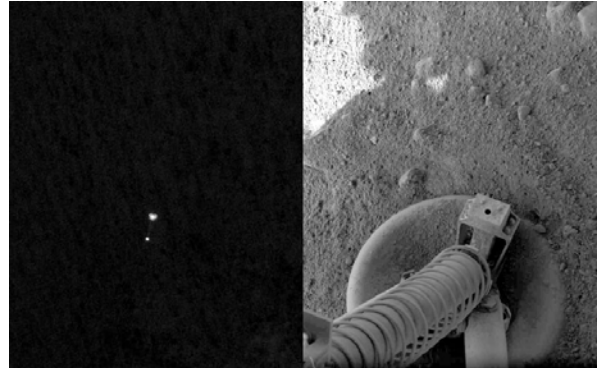


The Phoenix Has Landed!!



Phoenix logo - a composite representing several mission themes.

Sunday, May 25, 2008 marked the landing of the next visitor to Mars. Mars Phoenix Lander is a combination of two previous Mars Missions. The spacecraft was built for the Mars Surveyor Program 2001 (MSP '01) lander. The instruments aboard the Phoenix were from the Mars Polar Lander (MPL).



The Phoenix spacecraft has a robotic arm with a scoop at the end for digging into the Martian soil. Above the scoop is a camera. This camera has already provided images of Mars, including an image of possible Martian ice, <http://antwarp.gsfc.nasa.gov/apod/ap080602.html>, up close. Besides the camera on the arm, there is the Surface Stereo Imager mounted on a mast. The imager will be taking high-resolution, color stereo images of the terrain.

Also onboard the Phoenix is the Thermal and Evolved-Gas Analyzer, the Microscopy, Electrochemistry, and Conductivity Analyzer, and the Meteorological Station. The first instrument will heat the soil samples and then measure how much water vapor, carbon dioxide, and organic compounds are given off as the temperature is increased.

The second instrument consists of several components. "Optical and atomic-force microscopes will examine samples' mineral grains. Four electrochemistry cells will measure a wide range of chemical properties, such as the presence of dissolved salts and the level of acidity or alkalinity. A conductivity probe mounted on the robotic arm will check the soil's thermal and electrical properties." <http://mars.jpl.nasa.gov/newsroom/factsheets/Phoenix.pdf>. Both of these instruments are remnants of MSP'01.

Image taken by: Surface Stereo Imager



Lastly, the Meteorological Station will be monitoring the Martian atmosphere. It will be looking at the temperature and amount of dust and water abundance found in the atmosphere.

Check out the Phoenix Mars Mission homepage: <http://phoenix.lpl.arizona.edu/> and on Twitter: <http://twitter.com/MarsPhoenix>

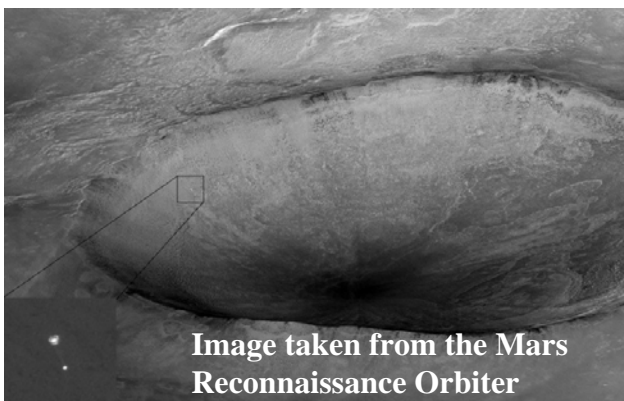


Image taken from the Mars Reconnaissance Orbiter



Martian Ice?



The Great Planet Debate

Science as Process

A Scientific Conference & Educator Workshop

*For more information visit
<http://gpd.jhuapl.edu>*

August 14-16, 2008
The Johns Hopkins University
Applied Physics Laboratory
Laurel, MD
Kossiakoff Center

Purpose

To review what we have learned about planetary bodies, both inside and outside our Solar System, and to discuss and debate the criteria used to define and categorize planets, as a scientific process that is continually evolving.

Educator Workshop

An educator workshop on August 16th will provide a forum on how the planet debate can be used to spark scientific inquiry in the classroom.

Sponsors

National Aeronautics Space Administration
The Johns Hopkins University Applied Physics Laboratory
Planetary Science Institute
American Astronautical Society

NASA Science News has published several articles last month. Please follow the links to read the full stories. Check out our RSS feed at <http://science.nasa.gov/rss.xml>!

Women Drivers on Mars

To celebrate Women's History Month, an all-female team of scientists and engineers has taken control of Mars rover Spirit. Is Mars exploration different with women calling the shots? Find out in today's story from Science@NASA. http://science.nasa.gov/headlines/y2008/12mar_spiritday.htm?list907815

The Vanishing Rings of Saturn

Amateur astronomers around the world have noticed, something is happening to Saturn. The planet's rings are rapidly narrowing and, if this continues, before too long they will be reduced to a wafer-thin line invisible to backyard telescopes. What's going on? Check today's story for the answer. http://science.nasa.gov/headlines/y2008/18mar_saturn.htm?list907815

Gravity Waves Make Tornadoes

New research by NASA-supported scientists shows how atmospheric gravity waves, the kind we often see rippling in clouds overhead, can hit a thunderstorm and turn it into a deadly tornado. http://science.nasa.gov/headlines/y2008/19mar_grits.htm?list907815

Spring is Aurora Season

For reasons not fully understood by scientists, the weeks around the vernal equinox are prone to Northern Lights. In other words, spring is aurora season. Observations from NASA spacecraft are shedding new light on this old mystery. http://science.nasa.gov/headlines/y2008/20mar_spring.htm?list907815

Naked-eye Gamma Ray Burst

Two nights ago, astronomers observed a cosmic explosion so intense it was visible to the naked eye from a distance of 7.5 billion light years. http://science.nasa.gov/headlines/y2008/21mar_nakedeye.htm?list907815

Crafty Tricks for Finding Moon Water

NASA's Lunar Reconnaissance Orbiter, due to launch in 2008, will play some crafty tricks to find water on the moon. These include using starlight to see into deep, dark craters and checking the temperature with a device known as "Diviner." http://science.nasa.gov/headlines/y2008/27mar_moonwater.htm?list907815

Old Solar Cycle Returns

Three months ago, a new solar cycle began. This week, however, the sun surprised onlookers with three big sunspots from the previous solar cycle. Strangely enough, this is perfectly normal. Find out what's happening on the sun in today's story from Science@NASA. http://science.nasa.gov/headlines/y2008/28mar_oldcycle.htm?list907815

Crescent Moon Alert

A crescent moon of perilous beauty is about to appear in the evening sky. The best night to look is Tuesday, April 8th, when the moon joins the Pleiades star cluster for a must-see conjunction. http://science.nasa.gov/headlines/y2008/04apr_crescentmoon.htm?list907815

The 2008 Great Moonbuggy Race

Contestants in NASA's 15th Annual Great Moonbuggy Race have crossed the finish line. And the winner is.... Read today's story to find out who crashed and who triumphed in the adventurous competition.

http://science.nasa.gov/headlines/y2008/07apr_moonbuggyrace.htm?list907815

Moondust in the Wind

Unlike Earth, the firmament of the moon is directly exposed to charged particles from the sun. What happens to moondust under the onslaught of solar wind? Researchers in a NASA-supported lab are finding some surprising answers. http://science.nasa.gov/headlines/y2008/10apr_moondustinthewind.htm?list907815

Earth's Magnetic Field Does Strange Things to the Moon

NASA-supported researchers have realized that strange things may be happening on the full Moon when it gets hit by Earth's magnetic tail. http://science.nasa.gov/headlines/y2008/17apr_magnetotail.htm?list907815

Moondust and Duct Tape

Going to the Moon? Don't forget your duct tape. Thirty-six years ago when Apollo 17 astronauts found themselves a quarter million miles from home with a damaged moonbuggy, a roll of "good old fashioned American gray tape" saved the day. http://science.nasa.gov/headlines/y2008/21apr_ducttape.htm?list907815

The Physics of Whipped Cream

An experiment in space has shed new light on the puzzling physics of some everyday substances such as blood, ketchup, motor oil and whipped cream.

http://science.nasa.gov/headlines/y2008/25apr_cvx2.htm?list907815

4D Ionosphere

Today, NASA-funded researchers released to the general public a new "4D" live model of Earth's ionosphere. Without leaving home, anyone can now fly through the layer of ionized gas that encircles Earth at the edge of space itself. All that's required is a connection to the Internet.

http://science.nasa.gov/headlines/y2008/30apr_4dionosphere.htm?list907815

A Super Solar Flare

In September 1859, the sun unleashed a solar flare so intense it was visible to the unaided human eye. A ferocious geomagnetic storm ensued in which Northern Lights descended as far south as Cuba, the Bahamas and Hawaii. Meanwhile, telegraph engineers disconnected their batteries and powered communications by electricity from the auroras! Could it happen again? Read today's story to find out.

http://science.nasa.gov/headlines/y2008/06may_carringtonflare.htm?list907815

Planets by the Dozen

A NASA-supported sky survey set to begin in 2008 could dramatically increase the number of known planets outside our solar system. http://science.nasa.gov/headlines/y2008/08may_marvels.htm?list907815

Space Station Tricorder

Astronauts are using a Star Trek tricorder-like device to keep track of microscopic life forms onboard the International Space Station. http://science.nasa.gov/headlines/y2008/09may_tricorder.htm?list907815

Phoenix Set to Land on Mars

NASA's Phoenix lander is getting ready to touch down on Mars and begin an unprecedented investigation of the Red Planet's arctic realm. http://science.nasa.gov/headlines/y2008/13may_phoenix.htm?list907815

Galactic Hunt Bags Missing Supernova

For many years, astronomers have been puzzled by something missing in the Milky Way galaxy: exploding stars. Supernovas are supposed to appear two or three times every century, but none have been seen since the year 1680. Where are they? At long last, one of the "missing supernovas" has been found.

http://science.nasa.gov/headlines/y2008/14may_galactichunt.htm?list907815

100 Explosions on the Moon

NASA astronomers have been watching the Moon to see how often meteoroids crash into the lunar surface and they've just video-recorded their 100th explosion. This surprisingly bountiful data-set allows researchers to start drawing conclusions about when, where, and how often the Moon gets hit.

http://science.nasa.gov/headlines/y2008/21may_100explosions.htm?list907815

Lunar GRAIL

Gravitationally speaking, the moon is a strange place. Satellites in lunar orbit feel odd, sideways tugs and sometimes end up nose down in the moondust. Astronauts standing in the middle of lunar lava seas weigh more than they do standing on the shore. A new NASA mission named GRAIL aims to map the moon's quirky gravity field and thus pave the way for future exploration.

http://science.nasa.gov/headlines/y2008/22may_grail.htm?list907815

NASA's Phoenix Spacecraft Lands on Mars

NASA's Phoenix spacecraft landed on Mars Sunday, May 25th, to begin three months of examining an arctic site chosen for its likelihood of having frozen water within reach of the lander's robotic arm. Check today's story for details of the landing and first pictures beamed back from the landing site.

http://science.nasa.gov/headlines/y2008/25may_phoenix2.htm?list907815

Cartwheel Coronal Mass Ejection

Imagine a billion-ton cloud of gas launching itself off the surface of the sun and then ... doing a cartwheel. That's exactly what happened on April 9, 2008, when a coronal mass ejection or "CME" pirouetted over the sun's limb in full view of an international fleet of spacecraft. The cartwheel set off a chain of events that amazed even veteran solar physicists.

http://science.nasa.gov/headlines/y2008/27may_cartwheelcme.htm?list907815

Strange Ring Found Circling Dead Star

NASA's Spitzer Space Telescope has found a bizarre ring of material around the magnetic remains of a star that blasted itself to smithereens. Although rings and spheres of material are common in the universe, this one is not quite like any ring astronomers have seen before.

http://science.nasa.gov/headlines/y2008/29may_magnetar.htm?list907815

Librarian News



Lunar Librarian Network Expands Again

~ by Brooke Carter

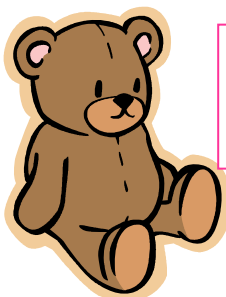
Yet another “Explore! To the Moon and Beyond” workshop was held, this time at Boston University in Massachusetts on March 25 – 26, 2008. By the end of the workshop, we expanded our cadre of Lunar Librarians by 30! Participants in the Massachusetts workshop were given an overview of the LRO mission that included an updated assembly video (<http://lunar.gsfc.nasa.gov/images/multimedia/LRO-022808.wmv>). The Massachusetts cadre really enjoyed the activities inspired by LRO. One participant commented, “I really appreciate the amount of activities that were offered today along with the wealth of information about space. It wasn't difficult to understand at all. YEAH! I feel comfortable enough to "answer" some space-related questions.” Nick Gross from the CRaTER team gave an enthusiastic tour of the CRaTER assembly and testing facilities. Everyone at the workshop was able to see how the pieces of CRaTER were put together – we even got to touch a piece of the tissue equivalent plastic! All in all, the Massachusetts “Explore! To the Moon and Beyond” workshop was a great success. Let's all give the new cadre of Lunar Librarians a warm welcome.



Our Newest LRO EPO Team Member:



I'd like to introduce the latest LRO EPO team member and my daughter, Abby.



Abigail Jean Amrhein
March 24, 2008 at 4:10 am
7 lbs 7.9 oz
19 ½ inches

Contributions from Our Librarians

Angelica Saucedo from the Anaheim Public Library, Anaheim, CA, has compiled a list of books, fingerplays, songs, and puppet shows dealing with the Moon and space. Over the next couple of months, we will be sharing her list. If you have activities or recommendations you would like to share with our librarians, please feel free to send them to me, heather_weir@ssaihq.com.

POEM:

Written by: Lisa Nowell
Did you know that NASA
Has a mission coming soon?
We want to build a place to live
way up on the moon.

Before we can get started
There's some facts that we must know
Like does the moon have any water?
Because we'll need some if we go.

So, we've built a special satellite
to shoot up into space
It'll orbit 'round the moon
and take pictures of the place

Hopefully these photos
Will show us where to land
A place that's not too rocky
Just powdery moon sand

There is no air to breathe there
The moon lacks atmosphere,
But at least there is some gravity,
We won't float off and disappear.

There are so many things
We have to figure out
NASA needs more scientists
of that there is no doubt

Are you good at solving problems?
Can you imagine something new?
Then study hard in science class
'Cuz NASA is for you!

SONGS:

WE'RE FLYING TO THE MOON (tune: "Farmer in the Dell")

We're flying to the moon, we're flying to the moon, (Suit actions to words)
We've left the Earth in our rocket ship, / and we're flying to the moon.
We're taking a walk in space
We're landing on the moon
We're walking on the moon
We're flying back to Earth



Links of the Month...

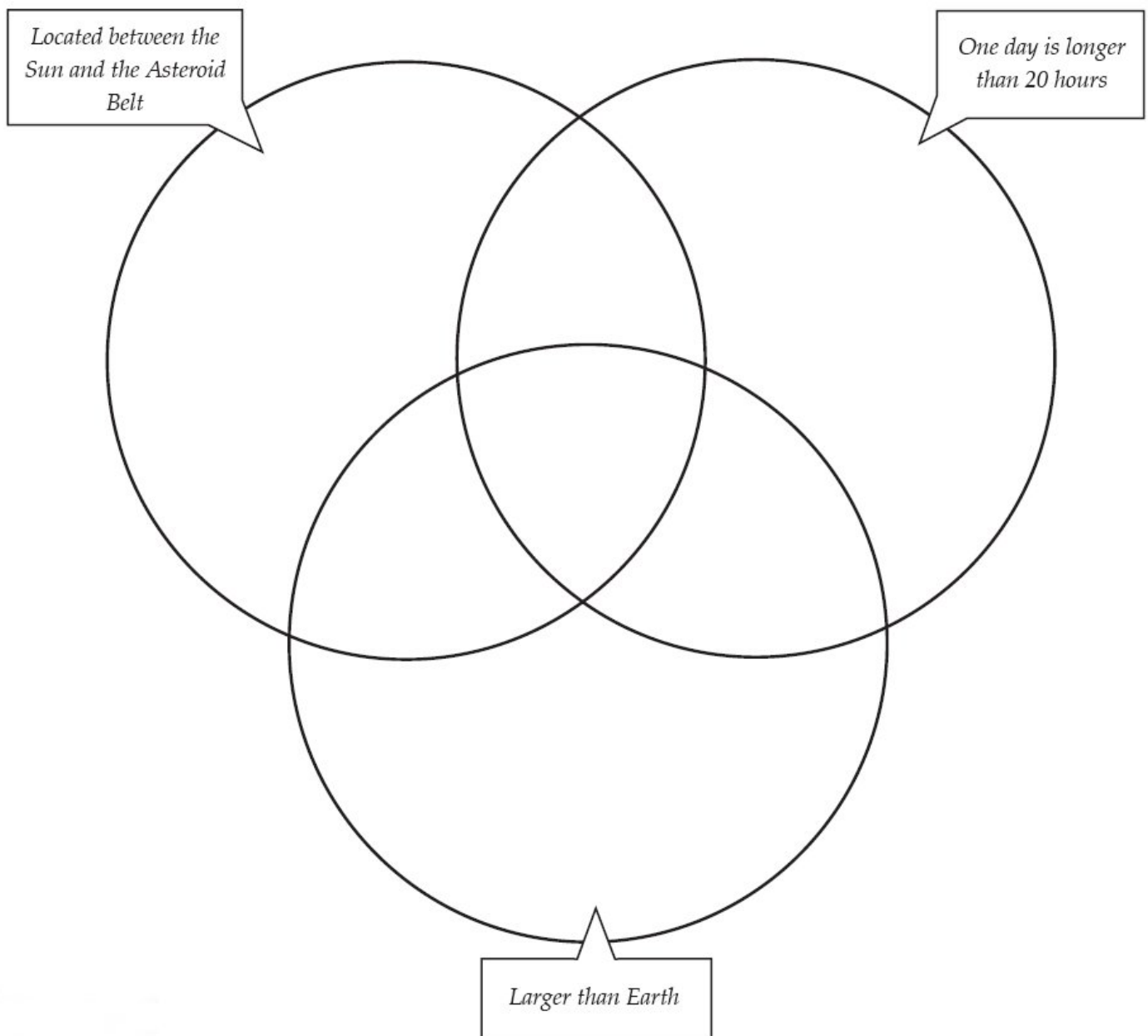
- Smithsonian Folklife Festival will be taking place on the National Mall, June 25-June 29 and July 2-6, 2008. For more information on the events taking place, please check out: <http://www.folklife.si.edu/festival/2008/index.html>.
- ALL KNOWN BODIES IN THE SOLAR SYSTEM LARGER THAN 200 MILES IN DIAMETER, <http://www.kokogiak.com/gedankengang/2007/03/all-known-bodies-in-solar-system.html>, find a useful diagram placing solar system bodies in size perspective. The site is useful in showing students why Pluto was demoted.
- CLIMATE CLUES IN SPRING FLOWERS, <http://www.budburst.org>. If you thought flowers were for special occasions, think again! Plants and flowers are also indicators for changes in climate. Through Project BudBurst, volunteers are helping track climate change by observing and recording the timing of flowers and other plants. U.S. students, gardeners and other citizens are entering their observations into an online database that, over time, will give researchers a more detailed picture of global climate change.
- A Field Guide to American Spacecraft! <http://www.americanspacecraft.com/>

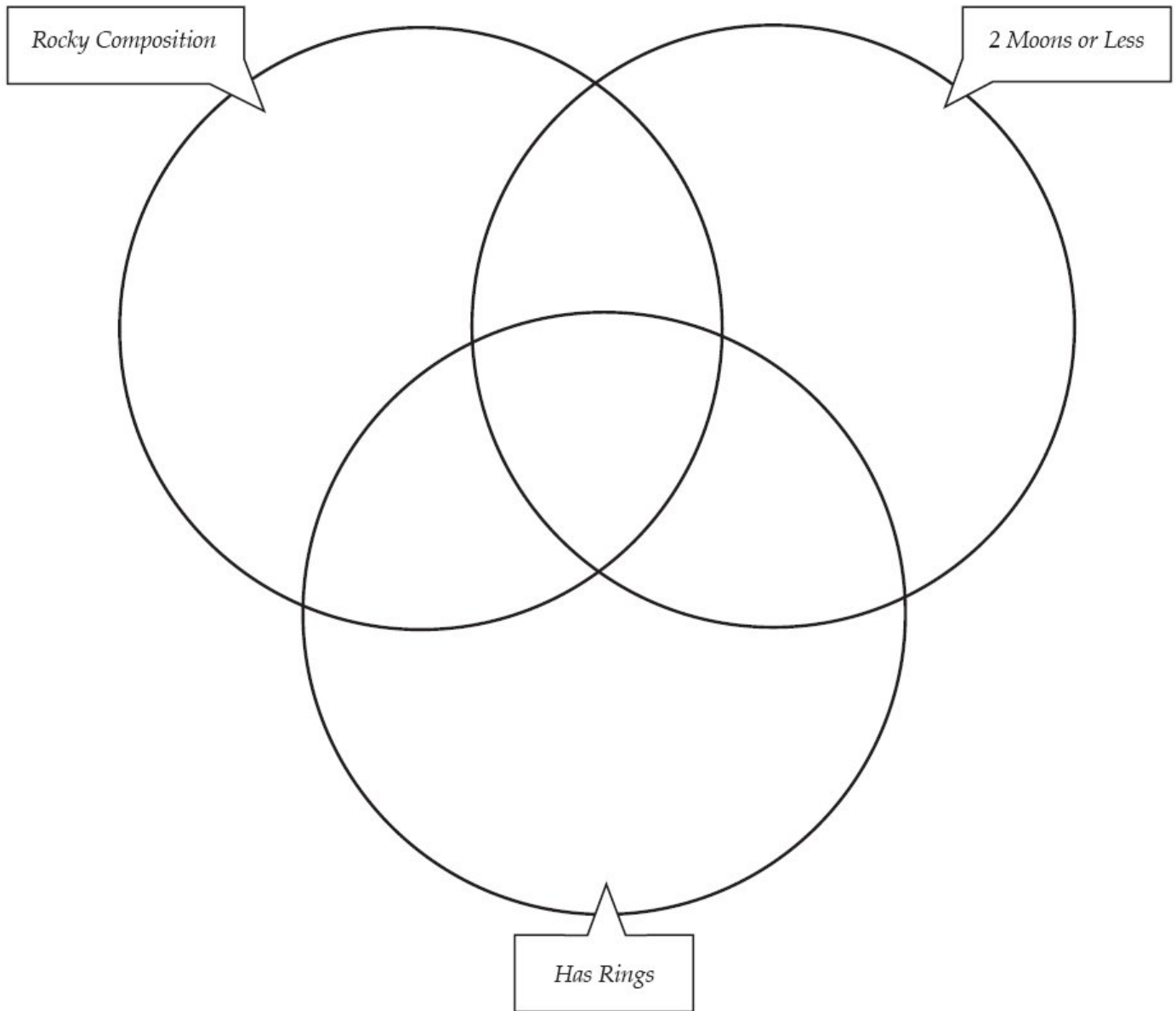
Monthly Activity

Voyage: http://btc.montana.edu/messenger/teachers/MEMS_CompPlanetology.php

Although each planet is a unique and majestic world, some similarities do exist between them. As a class you came up with several themes that reflect these similarities. The Venn Diagrams below can help to organize these themes.

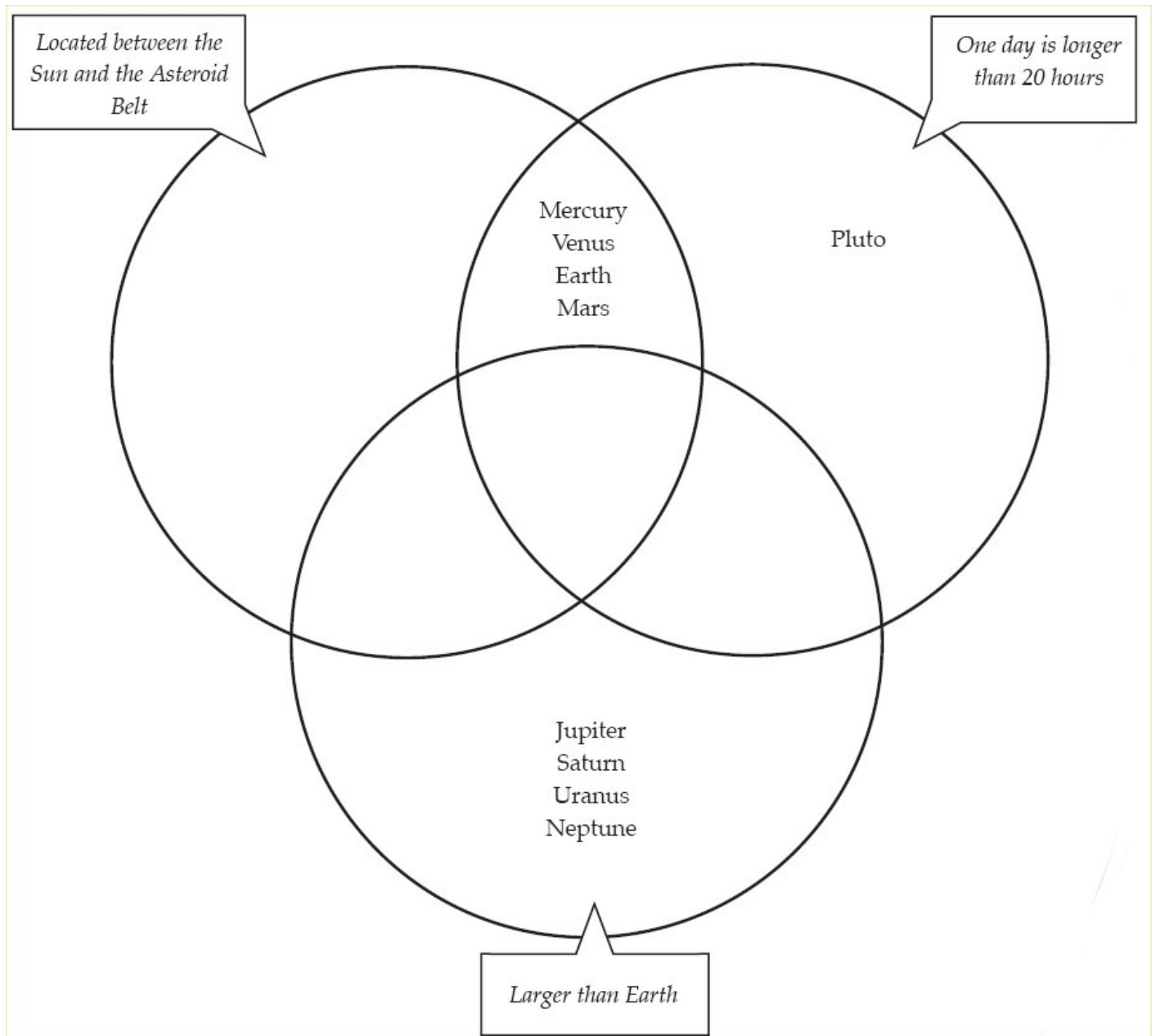
1. Use information from your research and class discussion to complete the following two Venn Diagrams by placing the planets' names in the correct locations.

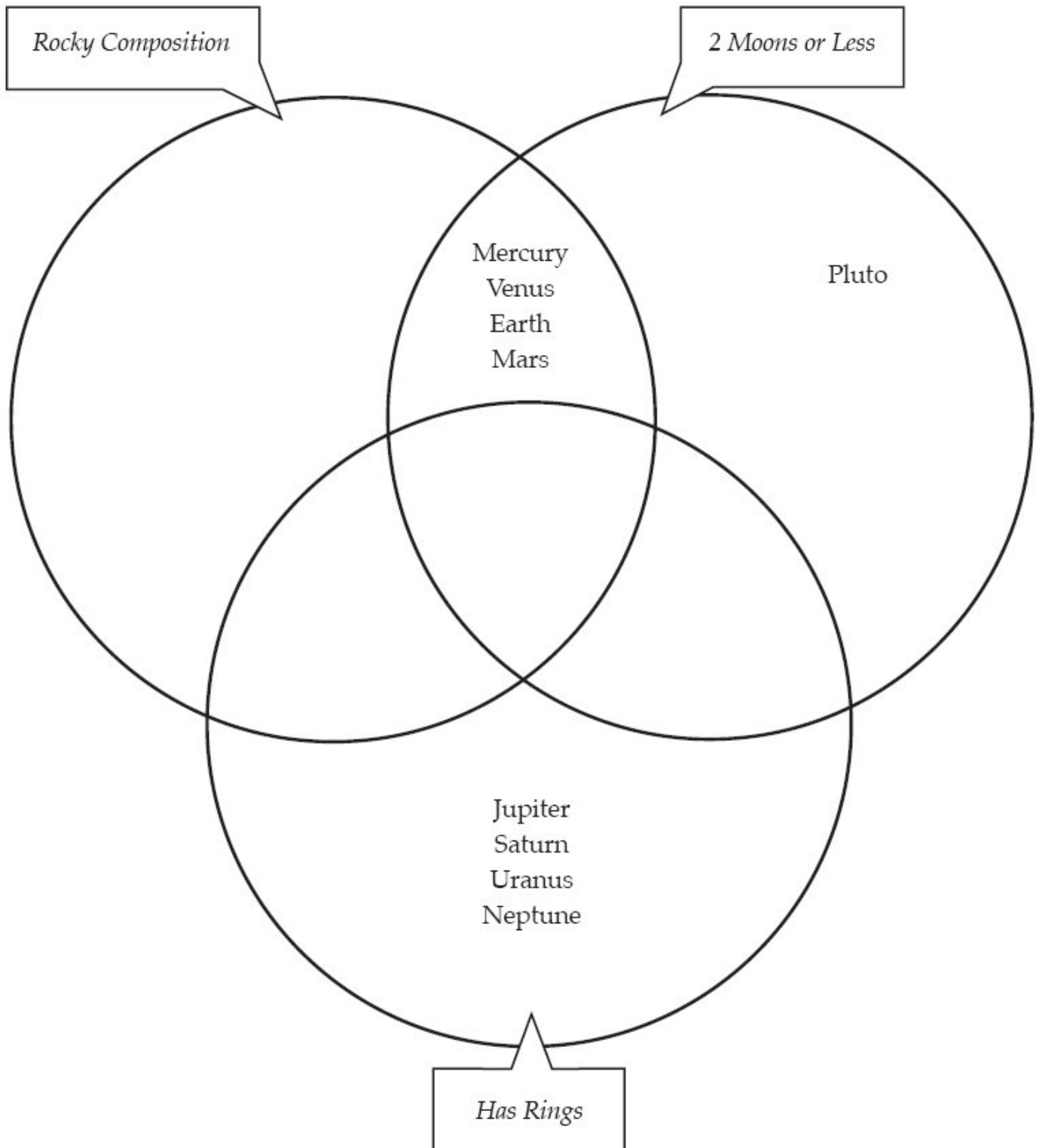




2. After you have completed the Venn diagrams, describe below how the planets seem to fit almost entirely within two categories based on the characteristics they share.

Answer Key:





2. The Venn diagrams very effectively organize the themes the class discussed. The planetary characteristics used on the two Venn diagrams were chosen so that the planets fall into identical locations on both diagrams. If students place the planets correctly, they can easily conclude that:

- Mercury, Venus, Earth, and Mars are: located between the Sun and Asteroid Belt, have a day longer than 20 hours (slow rotators), are Earth-sized or smaller, are rocky, have 2 moons or less, and don't have rings. They are termed the terrestrial (Earth-like) worlds.
- Jupiter, Saturn, Uranus, and Neptune are: located beyond the Asteroid Belt, rotate in less than 20 hours (fast rotators), are larger than Earth, are not rocky (they are gaseous), have more than 2 moons (actually families of moons), and have ring systems. These are the Jovian (Jupiter-like) planets.

Students should also conclude that Pluto seems to be in a class all by itself.

Students must use the planetary characteristics to support their conclusion of two main categories of planets.